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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/512,497	02/24/2000	Daniel M. Kinzer	IR-1649(2-1939)	5663
2352	7590	02/19/2004	EXAMINER	
OSTROLENK FABER GERB & SOFFEN 1180 AVENUE OF THE AMERICAS NEW YORK, NY 100368403			SEFER, AHMED N	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 02/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/512,497

Applicant(s)

KINZER ET AL.

Examiner

A. Sefer

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 22-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/10/2003 has been entered; claims 1-21 have been cancelled and new claims 22-43 have been added.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 22 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation “said conductive strip being narrow such that it makes contact only with a portion of each of said gate electrodes” is not clearly disclosed in the specification to enable one skilled in the art to make and/or use the invention. Without this information it would take undue experimentation to make and use the claimed invention.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 22-35, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinzer USPN 6,476,443 in view of Hsieh et al. USPN 5,763,915.

Kinzer discloses in figs. 5-8 a MOSgated device comprising a semiconductor body 80 of a first conductivity type; a channel region 82 of a second conductivity type formed in said semiconductor body; a conductive region 83 or source region (as in claim 24) of said first conductivity type formed in said semiconductor body and extending from major surface of said semiconductor body to at least said channel region; a plurality of spaced trenches 85 parallel to one another and coextensive with one another (as in claim 30) or are formed in a plurality of spaced rows and are parallel to one another and coextensive with one another within each row (as in claim 31) extending into said semiconductor body below said channel region, each of said trenches being adjacent a mesa and each terminating at a contact region in semiconductor body, said channel region and said conductive region extending into said contact region, and said conductive region uninterruptedly extending between each two adjacently disposed trenches; a gate insulation layer 90 comprising oxide (as in claim 26) and having a thickness greater than about 200 Å fully covering the interior of each said trenches (as in claim 35) dispose over the sidewalls and bottom of each of said trenches; a gate electrode 95 comprising polysilicon (as in claim 25) formed in each of said trenches over said gate insulation layer; and a remote contact 71

or source contact (as in claim 29) formed over at least said contact region and in electrical contact with at least said conductive region, wherein said remote contact extends through said conductive region to make contact with said channel region below said conductive region (as in claim 23), but does not disclose a conductive strip extending transverse to each of said trenches.

Hshieh et al disclose in figs. 4A, 4C a MOSgated device comprising a conductive strip 130' extending transverse to a plurality of trenches and electrically connected to each of gate electrodes 120, said conductive strip being narrow such that it makes contact only with a portion of said gate electrodes.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the teachings of Hshieh et al with Kinzer's device since that would eliminate the potential weak points of early breakdown as taught by Hshieh et al.

As for claim 27, Kinzer discloses an epitaxial layer 81 formed over a silicon substrate of the same conductivity and further comprising a second contact 73 or drain contact (as in claim 28) in electrical contact with said substrate.

As for claims 32-34, Kinzer discloses (see col. 2, lines 1-16) trenches having a depth of about 1.8 microns and extend to about 0.2 to 0.25 microns below said channel region (as in claim 33), wherein said trenches have a width of about 0.6 microns and a spacing of about 0.6 microns or greater (as in claim 34).

6. Claims 36-43, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinzer USPN 6,476,443 in view of Hshieh et al. USPN 5,763,915.

Kinzer discloses in figs. 5-8 a MOSgated device comprising an epitaxial silicon body of a first conductivity type; a channel region 82 of said first conductivity type formed in said epitaxial

Art Unit: 2826

silicon body; a source region 83 of said first conductivity type formed in said epitaxial silicon body and extending from a first major surface of said silicon body to at least said channel region; a plurality of spaced trenches 85 parallel to one another and coextensive with one another (as in claim 39) or are formed in a plurality of spaced rows and are parallel to one another and coextensive with one another within each row (as in claim 40) extending into said silicon body below said channel region, each of said trenches being adjacent a mesa and each terminating at a source contact region in said silicon body, said channel region and said source region extending into said source contact region, and said source region uninterruptedly extending between each two adjacently disposed trenches; a gate oxide layer 90 disposed over the sidewalls and bottom of each of said trenches; a polysilicon gate electrode 95 formed in each of said trenches over said gate oxide layer; and a remote source contact formed over at least said source contact region and in electrical contact with at least said source region, wherein said remote source contact extends through said source region to make contact with said channel region below said source region (as in claim 37), but does not disclose a conductive strip extending transverse to each of said trenches.

Hshieh et al disclose in figs. 4A, 4C a MOSgated device comprising a conductive strip 130' extending transverse to a plurality of trenches and electrically connected to each of gate electrodes 120, said conductive strip being narrow such that it makes contact only with a portion of said gate electrodes.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the teachings of Hshieh et al with Kinzer's device since that would eliminate the potential weak points of early breakdown as taught by Hshieh et al.

Art Unit: 2826

As for claim 38, Kinzer discloses a silicon substrate and a drain contact 73 in electrical connection with said substrate, said epitaxially silicon substrate being formed over said substrate.

As for claims 41-43, Kinzer discloses (see col. 2, lines 1-16) trenches having a depth of about 1.8 microns and extend to about 0.2 to 0.25 microns below said channel region (as in claim 33), wherein said trenches have a width of about 0.6 microns and a spacing of a bout 0.6 microns or greater (as in claim 34).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (703) 605-1227.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601.

ANS  
January 16, 2004

  
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